TENTEL Calibration Weight Set

Instruction Manual

TABLE OF CONTENTS

SECTION 1 - GENERAL COMMENTS

For most general tape tension measurement applications, the factory calibration will be more than sufficient, however, this weight set provides users with a method of verifying that their TENTELOMETER® is still performing to factory specifications.

It is also the intention of this instruction to provide a method of producing extremely close tension readings, approaching pointer line width accuracy!

This calibration weight set is designed to solve the following field "situations" regarding use of the TENTELOMETER® in-line tape tension gauge.

Situation A:

TENTELOMETER® was damaged and scale linearity is out of spec. (Checking the gauge at only the one ounce tension value does not check scale linearity.) Section 5 shows how to check for accuracy, linearity problems.

Situation B:

Extremely close tension tolerances are required at specific points in the tape path. TENTELOMETER® factory specifications of ±5% for ball bearing probe models are not close enough. Section 6 shows how to set ball bearing probe model gauges for very tight limits at any desired tension.

Situation C:

Extremely close tension tolerances are required at specific points in the tape path. TENTELOMETER® factory specifications of ±10% for non ball bearing probe models are not close enough. Section 7 shows how to set *non* ball bearing probe model gauges for very tight limits at any desired tension.

SECTION 2 - PARTS LIST

The calibration weight kit consists of the following components:

1. Instruction Manual
2. Weight set carrying case with tape sample compartment.
3. One ounce hanger rod with integral tape holding clip and weight stop.
4. WEIGHTS (Accurate to within ½%)
   - (1) 1 oz. Brass hanger with tape clip
   - (1) 1 oz. Brass weight
   - (1) 2 oz. Brass weight
   - (2) 4 oz. Brass weights
   - (1) 8 oz. Brass weight

These weights are marked with their weight in ounces.

SECTION 3 - CARRYING CASE LAYOUT

The plastic carrying case is divided into two sections. The weight set is contained in the front section; rear section is available for storage of various tape samples. These tape samples should be marked as to their brand name, type, oxide surface, etc., and can be used for proper calibration of the TENTELOMETER® for use on various machine and tape applications.

SECTION 4 - WEIGHT TABLE

This weight set can be used to make up any one ounce increment from 1 to 20 ounces as follows:

Total Ounces	Use Weights	Gram Equivalent
1	H = Hanger	28.35
2	H + 1	57
3	H + 2	85
4	H + 1 + 2	113
5	H + 4	142
6	H + 1 + 4	170
7	H + 2 + 4	198
8	H + 1 + 2 + 4	227
9	H + 8	255
10	H + 1 + 8	284
11	H + 2 + 8	312
12	H + 1 + 2 + 8	340
13	H + 4 + 8	369
14	H + 1 + 4 + 8	397
15	H + 2 + 4 + 8	425
16	H + 1 + 2 + 4 + 8	454
17	H + 4 + 4 + 8	482
18	H + 1 + 4 + 4 + 8	510
19	H + 2 + 4 + 4 + 8	539
20	H + 1 + 2 + 4 + 4 + 8	567
21	———	595

SECTION 5 - CHECKING SCALE LINEARITY ON A TENTELOMETER® TO FACTORY SPECIFICATIONS

Calibrate the TENTELOMETER® with the one ounce brass hanger supplied in the weight set by clipping the hanger onto a sample of the magnetic tape on which it will be used. (If checking the gauge on 2" tape, set up the gauge with 2 ounces, by using the hanger and the one ounce weight.)

Now check the gauge reading by placing other weight values on the hanger. Good working numbers are as follows:

H5 or H7 oz. scale 1, 3, 5
H12 or H15 oz. scale 1, 5, 10
H20 or L20 oz. scale 1, 10, 20

Move the gauge up and down slightly and read the "average" of these readings. Note: gauges with ball bearing rollers will read the same regardless of up or down movement.

The factory tolerance, based on the average reading, is specified as follows: ±10% of reading on gauges with non-rotating probes and ±5% of reading on gauges with ball bearing rollers. Gauges outside this specification should be returned to the factory for recalibration per the repair service instruction on the back page of the TENTELOMETER® instruction manual.

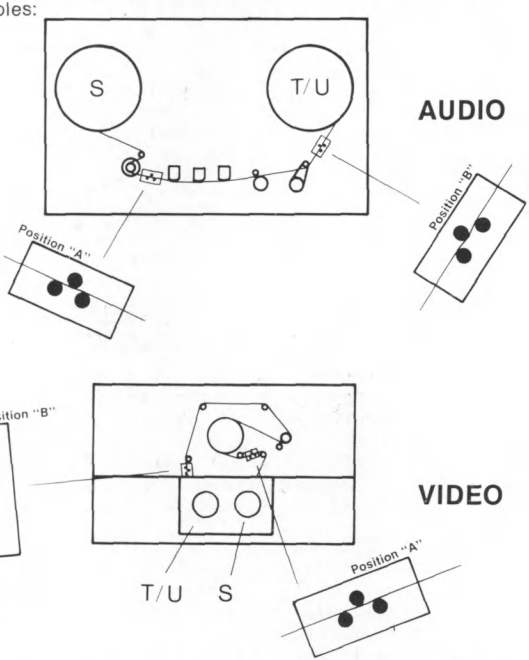
SECTION 6 - CALIBRATING THE TENTELOMETER® FOR GREATEST SINGLE POINT ACCURACY ON MODELS WITH BALL BEARING ROLLERS (1, 2, CB)

Models with ball bearing rollers can be field "calibrated" to extremely close tolerances (within ±2%) with the aid of the calibration weight set.

a. Make sure the TENTELOMETER® works to factory specifications as per Section 5 above.
b. Obtain a 12" sample of the tape on which the machine measurements will be made.
c. Place the TENTELOMETER® on the machine at the location where measurement is desired, and make an initial tension reading.
d. Select weights totaling within a half ounce of the measured tension and calibrate the TENTELOMETER® on the tape sample and at the tension selected from the weight set. Use the "zero" adjust screw to set the TENTELOMETER® pointer to exactly the reading of the weights suspended on the tape sample. The gauge is now calibrated at "this" tension to provide extremely close accuracy.
e. Return to the machine to measure the most accurate tension possible at this scale range.
f. The gauge may need recalibration per Section 5 to return it to overall factory stated specifications.

SECTION 7 - CALIBRATING THE TENTELOMETER® FOR GREATEST SINGLE POINT ACCURACY ON MODELS WITHOUT BALL BEARING ROLLERS (UM, ML, A)

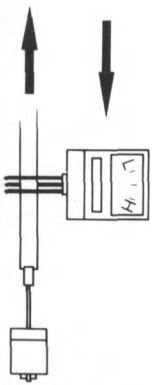
Models without ball bearing rollers can likewise be field "calibrated" for extremely close tolerances at any one point with the aid of the calibration weight set. This calibration must however, take into account the tape back coating, tape direction, tape speed, and the direction from which the tension acts.
Examples:



These factors can be simulated for TENTELOMETER® calibration as follows:

Video: Position A:

- Back Coating rubs on the outer probes.
- Tape direction is from High scale toward zero.
- Tape speed is low.
- The tension force acts from the supply reel brake (The high side of the scale).

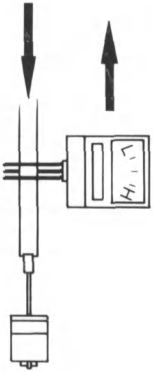


This can be simulated by holding the gauge in the right hand (putting the force on the high side of the scale), pulling a sample of the tape upwards, at a slow steady speed, with the back coating facing us to rub the outer probes.

Rotate the "zero" adjust screw so that the weight (3 oz. for U-Matic) causes a reading of 3 ounces on the TENTELOMETER® scale. The accuracy is now set to within 2% at the 3 ounce position.

Video: Position B:

- Back coating now rubs on the center probe.
- Tape direction is now from zero to high scale.
- Tape speed is *still* low.
- The tension force acts from the take-up reel brake (The high side of the scale).

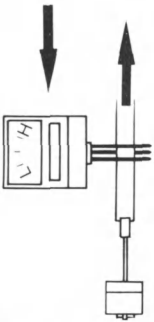


For maximum accuracy, the gauge would now be held in the right hand to place the force on the high end of the scale, the tape would go *down* thru the probes, and the tape back coating would face away from us toward the center probe.

Again turn the "zero" adjustment screw so that the TENTELOMETER® reads the value of the weight suspended on the tape.

Audio: Position A:

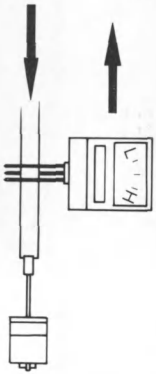
- Back coating rubs on outer probes.
- Tape direction during play or record is from zero to high scale.
- Tape speed is low.
- Tape tension force acts from the holdback supply reel brake. (The zero side of the scale).



This can be simulated by holding the gauge in the left hand (putting the force on the zero side of the scale), pulling the tape upwards, at a slow steady speed, with the back coating facing us to rub the outer probes. Turn the "zero" adjust screw so that the gauge reading agrees with the weight suspended on the tape.

Audio: Position B:

- Back coating rubs on outer probes.
- Tape direction is now from zero to high scale.
- Tape speed is low.
- The tension force now acts from the take-up reel brake (The high side of the scale).



This can be simulated by holding the gauge in the right hand (putting the force on the high end of the scale), move the tape downward through the probes at a low steady speed and with the back coating facing us to rub the outer probes.

Again turn the "zero" adjustment screw so that the gauge reading agrees with the weight suspended on the tape.

Probably the hardest concept to grasp with this technique is: "What direction" the tension is acting from; in general, the tension acts on the gauge on the side opposite to the pinch roller/capstan. The logic used in these examples should enable the standard non ball bearing probe model TENTELOMETER® to be set up at any particular point to yield extremely close tension readings.

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